Appl. No. 10/517,601
Amdt. dated July xx, 2008
Reply to Office action of June 30, 2008

REMARKS/ARGUMENTS

This letter is responsive to the Office Action mailed June 30, 2008. Re-consideration of the application is requested. Claims 1-12 are in the case.

Claim Rejections- 35 USC § 101

The Examiner rejected claims 5 to 8 under the section as being directed to non-statutory subject matter.

Claim Rejections– 35 USC § 103

The Examiner has rejected claims 1-12 as being unpatentable over Samani et al (Biomechanical 3-D Finite Element Modeling of the Human Breast Using MRI Data) in view of Brady et al (US 7,315,640). This rejection is respectfully traversed with respect to the claims as amended.

Claim amendments

Claims 1, 5 and 9 have been amended to specify that the phantom thickness object is generated based on an x-ray mammogram of a physical phantom breast. Support for these amendments can be found at lines 8 to 12 of page 6 of the specification. In response, the Applicant has amended claims 5 and 7 - 9 based on the Examiner's comments to recite that the computer program product comprises a computer-readable recording medium. Support for this amendment can be found on page 3 of the specification. Amendments to claims 8 and 12 have been made to correct typographical errors.

Detailed Replay to Claim Rejections – 35 USC § 101

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As noted above, and in response to the Examiner's rejection of claims 5 to 8, these claims have been amended to indicate that the recording medium is a computer-readable recording medium. It is respectfully submitted that this amendment is supported by page 3 of the specification, as it would be understood by a person skilled in the art of current electronic devices. Specifically, such a person would know that a "recording medium" includes a magnetic or optical storage device, as it is used for storage for a computer system. It is generally known that current storage technology or recording technology relies upon magnetic recording devices, optical recording devices, and some non-volatile memory (commonly called "flash memory").

Withdrawal of the rejection of claims 5 to 8 is respectfully requested based on the foregoing, and the amendment of claims 5 to 8.

Detailed Reply to Claim Rejections – 35 USC § 103

Not all of the elements of claim 1 are recited in Samani or Brady

The Examiner argues that Samani teaches the elements of clause (a), i.e., 'generating a phantom thickness object for transforming into the breast thickness object, the phantom thickness object being generated in a three-dimensional modeling means and being substantially breast-shaped'. The Applicant respectfully disagrees with this assertion.

Samani describes the finite element (FE) mesh generation method for a breast. After the mesh generation component of the model has been developed, Samani describes how this mesh generation component is validated using a cubic agarose phantom with a cylindrical inclusion. Specifically, this phantom is constructed and imaged using MRI. Then, using these images, finite element meshes are created using the meshing techniques described by Samani. The accuracy of these meshing techniques can then be determined by comparing the resulting mesh with a mesh created manually based on the known geometry of the phantom. Samani does describe modeling a human

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breast (see page 275, paragraph 3). However, Samani does not use the phantom to provide this model. Instead, the finite element mesh model is generated using MRI data, as indeed is specified by the title of this article.

Accordingly, it is respectfully submitted that Samani does not disclose an element corresponding to the phantom thickness object as recited in claim 1. Specifically, even if the phantom described by Samani is taken to correspond to the physical phantom of claims 1, 5 and 9 as amended, the image generated from this physical phantom cannot be taken to correspond to the phantom thickness object also recited by these claims for at least two, related, reasons. That is, Samani describes using MRI to provide images of a cubic aragose phantom with a cylindrical inclusion. However, this image is not for transforming into the breast thickness object, nor is this image substantially breast-shaped. There is no need for this in the context of Samani as both the phantom and the image are generated merely to test the meshing techniques developed.

With respect to clause c) of claim1, the Examiner notes that Samani fails to teach this recited limitation. However, the Examiner takes the position that Brady et al. teach the use of a set of dimensions to enhance and normalize x-ray images.

Despite a careful review of the teachings of Brady et al., Applicant has been unable to determine any portion of this description that discloses a phantom thickness object that is generated by providing an x-ray of a physical phantom. Thus Brady et al. cannot describe "transforming the phantom thickness object to conform to the set of dimensions [for the breast] to provide the 3-dimentional breast thickness object in the three dimensional modeling means".

Further, as noted above, Samani does not disclose this feature of claim 1 either. Specifically, the image of the cubic phantom generated by Samani does not appear to be substantially breast-shaped or to be generated for transforming into a breast thickness object. Not surprisingly, therefore, Samani does not describe transforming the

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image provided (to test the mesh generation) to provide the three-dimensional breast thickness object. This is not why the cubic phantom or the image thereof are provided by Samani in any case. Instead, this cubic phantom and image thereof are provided to test mesh generation.

Thus, it appears that the broad concept of transforming a phantom thickness object [obtained by providing an x-ray of a physical phantom] to conform to a set of dimensions of a breast to provide a three-dimensional breast thickness object is not disclosed by the art cited. Accordingly, it is respectfully submitted that claim 1 clears the art cited and that, for analogous reasons, claims 5 and 9 also clear the art cited.

If the Examiner elects to maintain her rejection of the claims as obvious in view of the references cited, then clarification is requested. Specifically, the Examiner is respectfully requested to identify what element disclosed by Brady et al. corresponds to the phantom thickness object recited by claim 1. Note that whatever this phantom thickness object might be, it does not seem that it could be the set of dimensions for a breast, as then the phantom thickness object would already correspond to the three-dimensional breast thickness object, and no transformation would be required. Accordingly, in the event that this rejection is maintained, clarification is respectfully requested.

Elements of claim 1 not obvious in light of Samani and Brady

Concerning Samani, while the cube-shaped phantom object is sufficient for illustrating the differences between the different modeling techniques discussed therein, Samani does not discuss how the cube-shaped phantom object can be transformed into the breast thickness object. As discussed, the rationale for this is that the breast-shaped model is derived from MR images. In contrast, the subject application explicitly teaches the user how the phantom thickness object is mapped onto the breast thickness object (p. 7 – lines 13-25).

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Furthermore, the results of Samani would teach away from the use of a phantom thickness object and toward the use of a computer-based three-dimensional model for determining breast thickness. At p. 279, Samani notes that "A[breast] image registration example was presented to evaluate the FE model's effectiveness in complex clinical applications. The results summarized in Fig. 8 qualitatively prove the merits of this model." Such statements would motivate a reader to build 3-D models of a patient's breast via the method taught by Samani to determine the breast thickness. This is because the thickness measurement would already be encompassed in the model discussed in Samani, and a separate thickness-only phantom object would not be necessary.

Concerning Brady, the method disclosed relies on identifying the smoothness of curves to determine when the breast is no longer in contact with the breast support plate (col. 17 line 44 – col. 18 line 56). It then discusses an iterative method of the user estimating the thickness and then reviewing the image to determine whether the estimate was accurate (col. 18 line 5–15). Brady motivates the reader to use the described method of determining breast thickness because it claims that such method provides two specific benefits: greater accuracy, and accounting for scattered and extra-focal radiation (col. 18 line 16-19). A reader thus would not be motivated to use the method in the subject application because it requires the creation of a phantom thickness object, and does not provide the benefits described by Brady.

However, in the subject application, instead of estimating the thickness and checking the image for accuracy based on curvature of arcs (which may lead to difficulty in determining the appropriate curvature – see Fig. 19; col. 18 lines 20–34 of Brady), the use of a phantom object provides an accurate reference point for correlating between the thickness of the phantom object and the thickness of the actual breast (p.6 line 23 – p.7 line 15 of the application).

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Accordingly, the references cited neither describe a breast-shaped phantom thickness object, nor any other object that is used in a manner that is similar to how the phantom thickness is used in the present application to estimate the thickness and check the image for accuracy.

In view of the foregoing, it is respectfully submitted that the claims clear the art cited. Accordingly, allowance of the application is respectfully requested.

Please contact the undersigned at the number indicated below if any questions arise.

Respectfully submitted,

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